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ABSTRACT

Colleges and universities are using the ACT test as a tool to help decide which students are awarded scholarships, admitted into programs, and declared eligible to participate in athletics. The purpose of this study was to see if students could improve their ACT mathematics score during junior year. A comparison was made of 52 Ritchie County High School students' mathematics scores on the October, 1995 PLAN (Pre-ACT) test to the mathematics scores on the April, 1997 ACT test. It was concluded that the best way students can improve their math scores is to enroll in more college preparatory math classes. Another way students can improve their scores is to have the teacher acquire old ACT tests and use them for problems of the day. Contains 46 references. (Author/NB)

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A STUDY OF THE EFFECTS OF TEST PREPARATION PROGRAMS ON ACT MATHEMATICS SCORES

A Thesis

Presented to

The Faculty of the Master of Arts Degree Program

Salem-Teikyo University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts in Education

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by

Ted L. VanScoy

November, 1997

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This thesis submitted by Ted L. VanScoy has been approved meeting the research requirements for the Master of Arts Degree.

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ABSTRACT

Colleges and Universities are using the ACT test as a tool to help decide which students are awarded scholarships, admitted into programs, and declared eligible to participate in athletics. The purpose of this study was to see if students can improve their ACT mathematics score during their junior year.

A comparison was made of fifty-two Ritchie County High School students' mathematics scores on the October, 1995 PLAN (Pre-ACT) test to the mathematics scores on the April, 1997 ACT test. The conclusion was that the best way a student can improve his or her math score is to enroll in more college prepatory math classes. Another way a student can improve his or her score is to have his or her teacher acquire old ACT tests and use them for problems of the day. The week long lunch hour preparation program at Ritchie County High School was not effective because there were too many students and not enough time.

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CHAPTER 1

INTRODUCTION

BACKGROUND

Established in 1959, the ACT Assessment is becoming increasingly more important. Colleges and Universities now use this test for admission decisions, academic advisement, career planning and financial aid (Morgan, 1992). Reading and mathematics are annually the lowest scores recorded of the four parts of the test (ACT 1988). Students who can raise their mathematics score will usually also raise their composite score (Munday, 1976). A student's ACT score is a good predictor of success as a college freshman (Bontekoe, 1992).

IMPORTANCE OF STUDY

The importance of this study is if a mathematics teacher can find a way to improve student's mathematics ACT scores within the confines of a secondary school's curriculum, then students will have a better opportunity to pursue a chosen career, receive financial aid, (Morgan 1992) and achieve success as a college freshman (Bonekoe, 1992).

STATEMENT OF PROBLEM

The problem that high school educators are facing today, is how can

students improve their ACT score within the confines of a normal school day without disturbing the school curriculum (Peltier,1989).

THE HYPOTHESIS

Ho: Students who participate in programs designed to improve their mathematics ACT score will show the same level of improvement as students who do not participate in such programs.

H1: Students who participate in programs designed to improve their mathematics ACT score will show a significant improvement compared to those students who do not participate in such programs.

THE ASSUMPTIONS

The first assumption is that the PLAN (Pre-ACT) is an accurate predictor of a students ACT score.

The second assumption is that students will put forth their very best effort and will understand the importance of the ACT test.

The third assumption is that the students who participated in this project represent a normal group of college bound juniors in high school.

LIMITATIONS

The study will be limited to juniors at Ritchie County High School who took the PLAN test in November 1995 and the ACT test in April 1997.

DEFINITIONS

ACT- American College Testing Program (Bontekoe, 1992)

College Prep- classes designed for the sole purpose of preparing secondary school students for college

G.P.A.-Grade Point Average

Lunch Time Prep- a program at Ritchie County High School designed to prepare students for the April ACT test, students and teachers give up a week of their lunch time to prepare for each of the four parts of the ACT test

Normal Distribution- a distribution of scores throughout the country where one half the students score above the norm (Educational Measurement & Testing, 1996)

PLAN- The pre-ACT test which is given to sophomores and used to recognize strengths and weaknesses and to predict a students probable ACT score

Problem of the day- a problem done by students while the teacher is taking role, these problems are similar to those taken from old ACT tests

SAT- Scholastic Aptitude Test (Bontekoe, 1992)

CHAPTER 2

REVIEW OF RELATED LITERATURE

HISTORY OF EDUCATIONAL TESTING

Educational tests are devices used to determine abilities of individuals, chart the progression of their achievements, and lately have been used to determine the effectiveness of educational programs. Performance based tests that are currently being used in disciplines such as art, physical education (Presidential Physical Fitness Test), vocational programs, driver education, music, and computer use, were the first type of tests. These tests were used by prehistoric man to see which man could best provide for their family. They were tested in such skills as fire-building, spear-throwing, and hunting (Educational Measurement & Testing, 1996).

Oral examinations began to replace performance based testing in most parts of the world. Still today, teachers and even tutors use oral quizes to evaluate students understanding of material. The job interview of today is based on the principle that not only a person's knowledge, but also his or her personality and mental ability are best judged by oral examinations. Doctoral programs usually culminate in an oral defense of a written thesis (Educational Measurement & Testing, 1996).

As early as 1850, American educators such as Horace Mann became skeptical of oral tests. They compared written and oral tests and decided that written tests were superior in a discussion of what are now called validity, reliability, and usability, basic concepts of psychometrics. These educators decided that written tests more accurately measure what they were suppose to, have fewer inconsistent results, and are easier to apply to norms (Educational Measurement & Testing, 1996). It was during this time that aptitude and achievement tests began being used for specific educational and occupation purposes (Dubois, 1970). The criticism of these achievement tests was that they measured ability to learn and not quality or quantity of work and therefore did not assure equal opportunity for all (Gould, 1981).

The first person to call for a number scale of educational performance was as Englishman, Sir Francis Galton. Another early pioneer in educational testing was Alford Binet who rejected the popular German theories and did studies of higher mental processes by observing in detail the development of his two daughters. Binet, at the request of the Ministry of Public Instruction, developed a method for selecting children who were too dull to be educated in ordinary schools. He later developed a scale and extended it to include the age level at which average children could manage the tests (Wolfe, 1973).

One of the first pioneers of intelligence tests in the United States was Lewis Madison Terman. Terman's study of differences between groups of very bright and very dull children on a variety of tests was used to obtain a Ph.D. from Clark University (1905). He was a member of the faculty of Stanford University from 1910 until 1942. In 1916 he developed what is now the most widely used intelligent test for children which he called the BINET intelligence test. This test later became known as the STANFORD-BINET Test and was the first test to introduce the term intelligence quotient(IQ). He also ran studies of army recruits in 1917 and the 1500 most intelligent children in California in the 1920's (Educational Measurement & Testing, 1996).

Tests given by individual teachers became the most common form of educational testing. These tests were usually essay, short answer, matching, true-false, or multiple choice and measured knowledge through recall. Grades assigned on the basis of these tests were then accumulated into a G.P.A., which became the best single predictor of college grades (Educational Measurement & Testing,1996).

It was discovered through educational testing, that secondary schools and colleges differ greatly from one another. Seniors in high school could

score as low as the average seventh grader and as high as a college senior (Ziomek, 1995). Later tests would show that grade inflation existed particularly in poverty level schools. One such study showed that students in schools with seventy-five percent free and reduced lunch who received A's in English recorded the same average reading test scores as those students in more affluent schools who received C's and D's (Ziomek, 1995).

In the late 1950's, it was determined that grades from a particular school could not be totally trusted to evaluate groups, individuals, and programs. This created the need for college entrance tests to aid in objectivity in measuring the ability of graduating high school seniors to perform academically at the college level. The two most common of these tests are the SAT (Scholastic Aptitude Test) and the ACT (American College Test) (Bontekoe, 1992). These tests became increasingly important in the 1960's when a tremendous increase in the college bound population made it a necessity for colleges and universities to acquire as much meaningful data as possible to help make decisions about admitting, placing, and awarding financial aid to their potential students (ACT, 1989). These tests remained the same for over thirty years until it was discovered that they had to be revised and their norms upgraded. The SAT was revised in 1994 to meet the

needs of a more diverse population, while the ACT went through such significant revisions in 1989 that it was renamed the Enhanced ACT (McManus, 1992).

CATEGORIES OF TESTING

Standardized tests are now commonly used in society today for many different reasons. Testing programs exist for entrance to professional and graduate schools. Some of these include the Law School Admissions Test, Medical College Admission Test, Graduate Record Exam (GRE), and the Graduate Management Admissions Test which is used for professional training in business and management (Educational Measurement & Testing, 1996).

Competency tests are now given in many states to determine whether or not a student should receive a high school diploma. Students must achieve a minimum competency level in reading and mathematics. Opponents of these tests argue that they are culturally, racially, and gender biased and at best should be given earlier than eleventh or twelfth grade to allow time for remedial work. Competency testing of teachers is becoming very popular in many states and most of these use the National Teacher Exam (Educational Measurement & Testing, 1996).

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Essay testing has become the least used category of tests because it is usually graded by one or two individuals and lacks objectivity. These tests may however become popular once a way is devised to have them computer graded (Educational Measurement, and Testing, 1996).

Standardized tests are also controversial because many believe they are culturally biased (Educational Measurement & Testing, 1996). Truth and disclosure laws have also been passed to allow the test takers to see their scores and sometimes even determine who else will be allowed to see them (Educational Measurement & Testing, 1996). The biggest controversy is whether standardized tests should be norm-referenced or criterion-referenced tests. In the late 60's and 70's tests that measured mastery of specific goals instead of comparison to norm groups became increasingly popular. This was the rationall for the National Assessment of Educational Progress. The difference between these groups; however, was often exaggerated (Educational Measurement & Testing, 1996).

The National Assessment of Education Project is a study of a norm referenced tests, that fits into a category of College Admissions Testing. Colleges and Universities found entirely too much difference in grading scales and Grade Point Averages (G.P.A.) to rely totally on these aspects to

predict a students college success, admit them into programs, and award them financial aid. Thus came the birth of College Admissions Tests to be used as a tool by colleges and universities to help gather data about prospective students (Kaplan, 1995). The two main tests required by colleges and universities are the SAT (Scholastic Aptitude Test), the test choice in the northeast, and on the east and west coasts, and the ACT (American College Testing Program), the choice of schools in the midwest (Kaplan, 1995).

COMPARISON OF ACT AND SAT

The SAT is an aptitude test that tests a student's ability to apply concepts learned. This test has two sections, Verbal and Mathematics, each of which is graded on a scale from 200 to 800 allowing a maximum score of 1600 (Seaton, 1992).

The ACT is an achievement test that tests for information already learned. This test has four sections, English, Science, Reading, and Mathematics, each scored on a scale from 1 to 36 resulting in a composite score based on the same scale. Test preparation seminars appear to be more beneficial for the ACT because of the make up of the test (Seaton, 1992).

The first attempt to convert SAT and ACT scores to a common score was done by the University of Illinois in 1980. The following chart illustrates their findings:

SAT Total	ACT Equivalent	SAT Total	ACT Equivalent
450	3	840-860	20
460	4	870-900	21
470	5	910-930	22
480-490	6	940-970	23
500-510	7	980-1010	24
520	8	1020-1050	25
530-550	9	1060-1090	26
560-570	10	1100-1140	27
580-590	11	1150-1190	28
600-620	12	1200-1250	29
630-660	13	1260-1300	30
670-690	14	1310-1350	31
700-710	15	1360-1410	32
720-740	16	1420-1470	33
750-770	17	1480-1540	34
780-800	18	1550-1590	35
810-830	19	1590-1600	36

(Langston and Watkins, 1980)

Jon Erickson, the director of the ACT Midwest Elementary/Secondary Services Staff did a conversion table based on the enhanced version of the ACT and SAT in 1995. This conversion chart is listed below (Erickson, 1995).

SAT Total	ACT Equivalent	SAT Total	ACT Equivalent
400-420	8	1050-1080	23
430-460	9	1090-1120	24
470-510	10	1130-1160	25
520-560	11	1170-1190	26
570-610	12	1200-1230	27
620-650	13	1240-1270	28
660-700	14	1280-1310	29
710-750	15	1320-1350	30
760-800	16	1360-1390	31
810-840	17	1400-1440	32
850-880	18	1450-1490	33
890-920	19	1500-1520	34
930-960	20	1530-1570	35
970-1000	21	1580-1600	36
1010-1040	22		

The conversion of the higher and lower test scores in both charts were similar, with the biggest discrepancy in the two conversion charts occurring in the midrange scores with the ACT converting to a much higher SAT score in 1995 than in 1980 (Erickson, 1995).

Kaplan Educational Centers outlined the differences and used this study to help students use the internet to decide which test to take. They found that the ACT has a science reasoning test while the SAT does not. The ACT math section includes trigonometry while the SAT does not. The SAT tests vocabulary much more than the ACT. The ACT is an entirely multiple-choice test while the SAT has other types of questions in addition to multiple

choice questions. The ACT does not have a guessing penalty while the SAT does. The ACT tests English grammar while the SAT does not. Beginning in the fall of 1996 , calculators were allowed for both tests. The difference between the two tests is that they test different skills. Kaplan suggests that students take sample tests, prepare early and take the tests more than once (Kaplan, 1995).

In a comparison of the revised SAT and ACT tests, Barbara McManus (1992) discovered some similarities. The ACT and SAT both administer pre-tests to sophomores, the PLAN and the PSAT, and they both allow the same amount of test taking time (3 hours). The revised SAT details its penalty for guessing by saying that on a question that has five answers, one-fourth of a point is subtracted for each incorrect answer; while on a question with four answers, one-third of a point is deducted for each incorrect response. The biggest difference McManus (1992) found was in the mathematics section. Fifty percent of the SAT is quantitive while only twenty-five percent of the ACT is quantitive. McManus suggests that a student who is weak in Math and has a choice of tests would be better off taking the ACT, while a student who has a reading deficiency might fare better with the SAT (McManus, 1992).

THE PLAN OR PRE-ACT TEST

The PLAN is a test constructed by the same people who construct the ACT and is administered to college bound students in the fall of their sophomore year in high school. The purpose of this test is to answer questions about a student's strengths and weaknesses in four academic areas, English, Mathematics, Reading, and Science Reasoning. It is also used to assess the student's knowledge of basic study skills such as time management, test preparation, and test taking. The test allows the student to become aware of a pattern of expressed needs such as reading speed, math skills, study skills, writing skills, and career planning. The test also identifies career interests and educational aspirations of sophomores and compares them to reference groups from their state and the nation. This test is also used as a predictor of a student's ACT score (Maxey, 1996).

Each school that participates in the PLAN program receives a School Profile Summary Report. This report includes the following:

1. The school's students' average performance on PLAN by course work.
2. The school's students' average performance on PLAN by gender, ethnicity, and course work.

3. Percentage of the school's students who scored at or below each PLAN score.

4. Percentage of the school's students who scored at or below each PLAN subscore.

5. The school's students' study skills.

6. The school's students' high school course work and PLAN performance.

7. The school's students' career preferences.

8. The school's students' educational aspirations.

9. The school's students' perceived needs for help.

Also included in these reports are an "Interpretive Guide" and a glossary that outlines course descriptions of college bound sophomores (ACT, 1995).

After the test has been administered, a school may purchase an item response summary report. This report breaks each sections weaknesses down to individual problems. The math department, for instance, would receive a report on the problems that their students missed most. If the PLAN School Profile Summary Report published by the ACT in Iowa City, Iowa identified special right triangles as a major weakness of a school's math department. This would require the concept to be retaught before the ACT test is taken the following year (ACT, 1995).

THE ACT ASSESSMENT TEST

Approximately 1,100,000 high school juniors and seniors take the ACT Assessment every year (Svec, 1995). This test is a battery of curriculum based achievement tests designed to measure students' higher order thinking skills and critical reasoning in the subject areas of Mathematics, Science, Reading, and English. These tests have a two-fold purpose of measuring a students' preparation to undertake the rigors of college and at the same time reflect the skills acquired and knowledge learned while in high school (Svec, 1995).

The ACT is published and graded by the American College Testing Program in Iowa City, Iowa (Bontekoe, 1992). The single prime purpose of the ACT is to predict how successful a student will be in college, especially during his or her freshman year. People who use this service, other than the test takers, include parents, high school guidance counselors, and college admissions offices. The ACT when taken at the end of a student's junior year either validates or repudiates what has been accomplished in high school. A student with a high G.P.A. who does not score well on the ACT may need to reevaluate their scheduling or test taking skills (Bontekoe,1992).

The ACT test also claims to be a predictor of college success, therefore the relationship between the ACT test and both college and high school G. P. A. is very important (Bontekoe, 1992).

Scores on the ACT test range from 1 to 36 although almost no score below 12 is actually received in a college admissions office and any score above 33 is met by colleges with wild celebration (Bontekoe, 1992). Any score below 7 is considered to be in the first percentile while any score above 33 is considered to be in the ninety-ninth percentile. A student with a score above 31 would probably be accepted anywhere and be given academic scholarships. A student with a score of 28 or better would be accepted into most elite academic institutions with less scholarship money . A student with a score of 19 or better will be accepted into most liberal arts institutions, but a student with a score of 18 or below may have to settle for a community or two year college (Bontekoe, 1992).

The ACT's basic philosophy is that the best indicator of future performance is a measure of past accomplishments (ACT Test Developement, 1995). The test was developed by using objectives, state approved textbooks, and consulting with educators in grades seven through twelve throughout the United States (ACT Test Developement, 1995). Item

writers, who are mostly teachers at a large variety of institutions ranging from small private to large public high schools and representing different ethnic backgrounds, gender, and geographic location, submit approximately 10,000 items for use on the ACT test. Items are then pretested and based on these results the questions that are deemed to be technically sound and appropriate in difficulty are submitted to ACT test specialists and review panels who make up the test. A slight difference from one test to another occasionally results, in which case the ACT norms them, so that an 18 will be an equal score on all tests. The process of writing an ACT test takes approximately two and one-half years (ACT Test Developement, 1995). It is the goal of the ACT Assessment program to provide as perfect an instrument as possible to serve both the needs of students and colleges in a completely fair and unbiased fashion (ACT Test Development, 1995).

TEST TAKING STRATEGIES

One of the most important things a student must do is select a proper test date. A student who takes the test to early may not score as well as they should, because they have not had the proper classes. A student who takes the test to late risks forgetting material and missing financial aid deadlines (Mortenson, 1989). Most research shows that the best time to take the ACT

is in April of the students' junior year in high school (Mortenson, 1989). This is the National ACT Test Date and not only allows the student time to retake the test if the student has a bad day but it also gives the student a head start on applying for acceptance into colleges and scholarships if one does well (Mortenson, 1989).

General test taking strategies include: pacing, reading carefully not only each question but also the directions, doing the easy questions first, answering every question because guessing is not penalized, reviewing ones work, checking ones answers, and making sure that erasures are thorough. A student should get enough rest the night before the test. The ACT also suggests not scheduling anything else on this day such as athletic contests because no single activity is worth risking an entire future to participate in. They recommend that students leave early for the test center in order to avoid flat tires and other things that might make a student late. A student should bring the following items: admission ticket, identification, three sharpened number 2 lead pencils, wristwatch, and a calculator to use on the mathematics test . A student also should not schedule an event immediately after the test to avoid hurrying or concentration problems (ACT Assessment, 1996-97).

ACT ASSESSMENT ENGLISH TEST

The English Test is a 75-question, 45-minute test that measures a student's understanding of written English and rhetorical skills. The questions are divided into six categories: punctuation (10 questions), basic grammar and usage (12 questions), sentence structure (18 questions), strategy (12 questions), organization (11 questions), and style (12 questions). Scores are reported in three categories, Usage/Mechanics (40 items), Rhetoric Skills (35 items), and Total score (75 items) (ACT Assessment, 1997).

Tips for taking the ACT English Test include pacing, if a student spends between one minute and a minute and a half reading each passage then he or she will have about 30 seconds to answer each question. A student, if possible, should spend less time on each question and use the time saved to review and work on the most difficult questions. Other tips include being aware of writing style, examining the underlined portions, being aware of the portions that are not underlined, noting the difference in answer choices, determining the best answer, and if time allows reread the sentence (ACT Assessment, 1996-97).

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The average score nationally on the English test in 1996 was 20.3 with a standard deviation of 5.4. The average of the subscores were 10.1 on the Usage/Mechanics with a standard deviation of 3.4 and a 10.4 on the Rhetoric Skills section with a standard deviation of 2.9. In 1996 the state of West Virginia had an average score on the English Test of 19.8 with a standard deviation of 5.1. The average subscores were 9.8 on the Usage/Mechanics section with a standard deviation of 3.3, and 10.1 on the Rhetoric Skills section with a standard deviation of 2.7 (ACT Profile Report, 1996).

THE ACT ASSESSMENT READING TEST

The ACT Reading Test is a 40-item, 35-minute test designed to measure a student's reading comprehension as a product of reasoning and referential skills. The test is divided into four categories: Prose Fiction (10 questions), Humanities (10 questions), Social Studies (10 questions), and Natural Sciences (10 questions). Scores are reported in the following categories, Arts/Literature (20 items), Social Studies/Sciences (20 items) and Total test score (ACT Assessment, 1997).

When taking the Reading test, a student should realize that if he or she takes two or three minutes to read each passage then that will only allow 35 to 41 seconds to answer each question. If possible a student should spent less

time on reading the passages and questions and allow time to review and work on the more difficult questions. The student should read each passage carefully and refer to the passages, while answering the questions (ACT Assessment, 1996-97).

The median score on the Reading test nationally in 1996 was 21.3 with a standard deviation of 6.1. The average subscores were 10.6 on the Social Studies/Sciences with a standard deviation of 3.4, and a 11.1 on the Arts/Literature with a standard deviation of 3.9. The West Virginia average reading score in 1996 was 20.7 with a standard deviation of 5.7. The average subscores were 10.3 in Social Studies/Science with a standard deviation of 3.2, and 10.8 in Arts/Literature with a standard deviation of 3.7 (ACT School Profile Report, 1996).

THE ACT ASSESSMENT SCIENCE TEST

The Science Reasoning Test is a 40-item, 35-minute that measures a student's reasoning, evaluation, analysis, interpretation, and problem solving skills in the area of natural sciences. Although the test includes the content areas of biology, chemistry, physics, and Earth/space sciences, it is broken down into three categories: Data Representation (15 questions), Research Summaries (18 questions), and Conflicting Viewpoints (7 questions). Only

one score is reported on the science test, for 40 items (ACT Assessment, 1997).

If a student spends 2 minutes reading each passage on the science test that will only allow he or she about 30 seconds to answer each question. If possible, a student should spend less time on the passages and questions and that would allow more time to review and work on the more difficult parts of the test. A student should read each passage carefully and note the different viewpoints in the passages (ACT Assessment, 1996-97).

In 1996 the average score on the Science Test nationally was 21.1 with a standard deviation of 4.6. In West Virginia the average score was 20.4 with a standard deviation of 4.1 (ACT Profile Report, 1996).

THE ACT ASSESSMENT MATHEMATICS TEST

The ACT Mathematics Test is a 60-item, 60-minute test designed to assess the skills that a student has acquired in grades 7 through 12. The test is designed to assess knowledge and skills, direct application, understanding concepts, and integration of conceptual understanding. The test is divided into six categories: Pre-Algebra (14 questions), Elementary Algebra (10 questions), Intermediate Algebra (9 questions), Coordinate Geometry (9 questions), Plane Geometry (14 questions), and Trigonometry (4 questions).

Scores are reported in four areas, Pre-Algebra/Elementary Algebra (24 items), Intermediate Algebra/ Coordinate Geometry (18 items), Plane Geometry/Trigonometry (18 items), and the total test score (60 items) (ACT Assessment, 1997).

Each question on the ACT Mathematics Test is designed to be completed in one minute, therefore, if a student is spending more time than that on a question, then he or she is probably doing it wrong. Beginning in the fall of 1996, the use of calculators has been permitted. A student should use his or her calculator wisely, as a time saving device and for computation only. A student should do the problems he or she is sure of first, then should eliminate others to a couple of choices and completely guess on the ones he or she is unfamiliar with since guessing is not penalized (ACT Assessment, 1996-97).

The national ACT Mathematics average in 1996 was 20.2 with a standard deviation of 4.8. The subscores averages were a 10.4 in Pre/Elementary Algebra with a standard deviation of 3.3, 10.0 in Algebra/Coordinate Geometry with a standard deviation of 3.0, and a 10.4 in Plane Geometry/Trigonometry with a standard deviation of 2.9. In West Virginia the Mathematics average in 1996 was 18.6 with a standard deviation

of 4.2. The subscores for West Virginia were 9.6 in Pre/Elementary Algebra with a standard deviation of 3.0. a 9.1 in Algebra/Coordinate Geometry with a standard deviation of 2.7, and a 9.4 in Plane Geometry/Trigonometry with a standard deviation of 2.7 (ACT Profile Report, 1996).

ACT COMPOSITE SCORES

Composite scores are found by averaging the scores of the four sections. In 1996, the average composite score was 20.9 with a standard deviation of 4.7. In West Virginia the average composite score for 1996 was 20.0 with a standard deviation of 4.2 (ACT Profile Report, 1996).

OTHER ACT ASSESSMENT SECTIONS

The ACT has three other test sections that are used for information gathering, data analysis, test bias checking, and college information. The first of these is the High School Course/Grade Information. This section is used to help check on grade inflation and to see if college bound students are being placed in the proper curriculum. The second section is the student profile section, this section lists the student's ethnic background, sex, special needs, extracurricular plans, financial background, and other factors that will influence their college choice. The data gathered from this section help the ACT check on ethnic and gender bias as well as helping colleges place and

search for sources of financial aid for their prospective students. The third section is an interest inventory that is used by high school counselors and college admissions offices to assist the undecided student with career planning and college choice (ACT Technical Manual, 1988).

GENDER DIFFERENCES ON THE ACT ASSESSMENT

Critics of the ACT Assessment have accused the test of being biased against females. A study done by a group led by Lei Han (1993) and presented to the National Council on Measurement in Education, found no significant difference in ACT English scores but they did find a significant gender difference in ACT Mathematics scores. Males consistently performed better than females even though no significant difference was found in their G.P.A.'s (Han, 1993). One explanation for this was that fewer females than males take advanced mathematics courses in high school (Fennema, 1977). By controlling career interest, major choice, and number and type of mathematics courses taken high school, the gender differences tended to be smaller but were not completely eliminated (Gamack & Novick, 1983).

Teachers' grades are usually not limited to test scores, but include completion of homework and personal-social behavior. Since females tend to do better on completion of homework and personal-social behavior, they

therefore obtain a higher G.P.A.'s. Comparing Act scores of the sexes with equal G.P.A.'s would therefore obviously favor males (Clark & Grand, 1984). Males and females also have different motivations in both performance and study habits that could lead to the discrepancy in test scores and courses taken (Betz, 1990).

THE ACT ASSESSMENT AS A PREDICTOR OF COLLEGE SUCCESS

Whether or not the ACT is a predictor of college success has become more of an issue since colleges award more financial aid based on this score (Princeton Review, 1997). The correlation between ACT scores and college success has not been strong (Princeton Review, 1997). Many people think that if a student does not do well he or she will be pumping gas and if a student does very well, Harvard will pick him or her up in a limousine, neither of which is true. The simple truth is that the ACT is a way for colleges to reduce their applicant pool (Princeton Review, 1997). Using the ACT in conjunction with other factors usually helps colleges reward financial aid and admit students with the best likelihood for success into programs (Princeton Review, 1997).

Most studies show that the ACT is a good predictor of college success. A study by Myers and Pyles called the ACT the best predictor of college

G.P.A. (Myers & Pyles, 1992). Research also indicates a significant relationship between high school G.P.A., ACT, and college G.P.A. (Smith, 1993).

Students with a score above 31 on the ACT will probably be successful in college and students with a score below 16 will struggle in college (Bontekoe, 1992). Individual institutions must decide where the students with the scores between 16 and 31 will fit (Bontekoe, 1992). A fact of life in the United States is that students come from various educational backgrounds and quality of family life. It is very difficult for higher education to overcome the reality that students come to them with weak educational backgrounds or unstable family lives (Bontekoe, 1992).

Fletcher (1989) examined the relationship between the Pre-Professional Skills Test (PPST) and the ACT. This study of 270 graduates found not only that the success on the ACT was a strong predictor of success on the PPST, but that success on the PPST was a strong predictor of success on the National Teacher Exam (N.T.E.). The study even suggested that a good ACT score should allow the PPST to be waived, because the study found that the ACT as a pre-test and the N.T.E. as a post-test should be a sufficient indicator of proficiency (Fletcher, 1989). Another study of teacher

education majors found that the ACT was a much better predictor of success on the N.T.E. than the grade point average (Loadman & Deville, 1990).

Some colleges and universities have been requiring students since 1991, to take a test called the Assessment of Skills for Successful Entry and Transfer (ASSET) test to place them in the proper English and Math course in college. North Texas Community College did a study of their prospective students who took the test in 1991 and found that 94 percent required mathematics remediation and that 50 percent required English remediation. These figures are a little bit misleading though because they decided that a student who received a minimum score on the ACT (18 in 1991) would not have to take the ASSET test (Jenkins, 1991). A student who had only three years of high school mathematics was declared to be deficient in mathematics unless he or she tested out of it on the ASSET or ACT test (Jenkins, 1991). Colleges throughout the nation have been administering College Placement Tests in both Math and English for the last twenty-five years (Sawyer, 1989). Lately they have discovered that they can save themselves both time and money by using the ACT Math and English score above a certain number to waive the College Placement Test. A student who scores above a 17 in math for instance, is now usually placed in College Algebra while a student above

a 25 in math may often waive College Algebra. The main reason for this change is that research has shown that students with these scores do not need remediation in college (Sawyer, 1989).

The National Collegiate Athletic Association (NCAA) feels so strongly that ACT is a valid predictor of college success that they have set a minimum total score for freshmen on the ACT to be eligible to participate in their Division I athletic programs and to receive an athletic scholarship. NCAA has instituted a sliding scale, the lower a students G. P. A. in the required 13 core courses, the higher his or her combined score on the four parts of the ACT must be. A 2.5 or above requires a combined score of 68, a 2.4 a combined score of 71, a 2.3 a combined score of 75, a 2.2 a combined score of 79, a 2.1 a combined score of 82, and a 2.0 a combined score of 86. Any student who has a G.P.A. below 2.0 is automatically declared ineligible. The NCAA has set these standards because they believe that a college athlete must have a solid academic background to be able to handle the rigors of college athletics and still be successful in the classroom (NCAA, 1996).

All the research has not been positive concerning the ACT as a predictor of college success. Thornell (1986) studied 100 freshmen entering a small state university in Mississippi found that although the ACT was a

contributor to the prediction equation, secondary school performance was a far better predictor of college success (Thornell, 1986). Bontekoe (1992) conducted a study at Trinity College and concluded that no definite ACT score seemed to predict college success. This study also critized some colleges for putting too much emphasis on one morning in a pressure filled testing center as opposed to four years of high school work (Bontekoe, 1992). The Princeton Review argues that the reason the ACT research is so favorable is that most of the research is actually done by the ACT themselves (Princeton Review, 1997). Beverly Morgan (1992) predicts that the ACT will become less important and other measures such as interviews, written personal statements, and student portfolios will become the principal bases for admittance into programs and rewarding of financial aid (Morgan,1992). Until this happens, high school teachers and students must continue to try to find ways to maximize their ACT and SAT scores because so much of a students' future still relies on that one measure (Kaplan, 1995-97).

CAN COACHING IMPROVE ACT SCORES

The first question that arises about test preparation seminars is whether or not they should even exist. Many say that no substitute for quality instruction can be found and the accuracy of scores achieved as a result of

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test preparation is questioned (Berlinger, 1986). Another question is when should test preparation take place. Many teachers feel that time is at a premium and that taking time out for test preparation seminars would have negative effects on students (Berliner, 1986).

As reasonable as these opinions are, the facts are that educators feel increased pressure from administrators to improve the standing of their school or county in student performance that is measured by standardized tests. One argument for coaching states that teachers in general are good test takers but not good test makers (Berlinger, 1986). The skills learned therefore during test preparation will remain with the student and improve with experience (Berlinger, 1986). The most important usefulness of coaching programs is that students will do better and therefore will have more choices to further their education and join a profession (Berliner,1986).

As early as 1961 a study was conducted of students with an IQ of 115 or better to see if they could improve their verbal SAT score. The first try produced a mean gain of 98.3 points and the second try which involved a longer more thorough test preparation, produced an improvement of 121.9 points. It was concluded that the longer the test preparation the more pronounced the improvement would be (Seaton, 1992). Since the

implementation of a county wide SAT test preparation program, the DeKalb County School System has found an increase in SAT scores for all their schools with some up to fifty-percent (Caplan & O'Rourke, 1988).

Some studies feel that it is easier to improve ACT scores than SAT scores, particularly in mathematics because the ACT is a curriculum based test (McManus, 1992). The belief of some educators is that ACT scores would increase artificially because students are being tested on knowledge already acquired. One of the most respected test preparation agencies, Kaplan Education Center, found this not to be true. Students who take the Kaplan test preparation seminar do raise their scores, but then they perform at this rate proving it equal to their ability (Seaton, 1992).

Williamson and Monroe (1983) studied methods of test preparation and came to the conclusion that cramming does not help much. This study showed that the best type of program included test taking strategies, relieving test anxiety, as well as a lengthy content review (Williamson and Monroe, 1983). Sampson (1985) found that preparation periods should be no shorter than five-weeks. This studied showed that students who participated in five to seven week programs produced double the improvement of those programs which ran one week or less (Samson, 1985). The research seems to conclude

that coaching does help improve ACT scores. The advantages to students are obvious, they will receive more financial aid and have a better chance of being admitted to quality programs if they participate in these programs. The most important factor seems to be the length of the program. More research is needed; however; to see if different types of tests require different types of coaching programs (Seaton, 1992).

CHAPTER 3

METHODS AND PROCEDURES

SUBJECTS

The subjects of this research project were members of the junior class of Ritchie County High School who took the ACT Assessment Test in April of 1997. Ritchie County High School is a rural West Virginia school that was formed in 1986 by the consolidation of Pennsboro and Harrisville high schools. The consolidation was bitterly contested, and the education of the students suffered as a result during the first few years. By the end of the 1988-89 school year, Ritchie County High School had some of the lowest test scores in the state and country on both the CTBS achievement test and on the ACT. An administration change in 1989 resulted in an increased emphasis on academics and especially the upgrading of test scores. By 1992 Ritchie County High School had become one of the best schools in the State. It was named a West Virginia School of Excellence in 1992 and in the April 1993 issue of Redbook magazine was cited as being one of the four most significantly improved schools in the nation (Weiss, 1994).

The excellent test scores have remained constant even though discipline and teacher moral have declined. The junior class of Ritchie

County had the highest CTBS scores of all West Virginia counties for the academic year of 1993-94. The following two years they finished second among the counties leading to an excellent academic reputation. The composite Act scores have increased by an average of as much as 8 points in the last 10 years and the scores on the mathematics section have increased by an average as high as 10 points. In the last 3 years Ritchie County High School has awarded 34 Top of the Mountain Awards, that go to the top 10% in the state of West Virginia on the ACT test. Individual ACT composites have reached as high as 34 and individual scores on the mathematics section have reached as high as 35. Financial aid for college has increased from below $75,000 in 1988 to over $400,000 in each of the last three years (Langford, 1988,1994,1995,1996).

The ACT School Profile Summary Report lists the following test results for Ritchie County High School graduating class of 1996. The English test showed an average score of 21.5 with a standard deviation of 5.0. The average of their subscores were 10.9 in Usage/Mechanics with a standard deviation of 3.3, and 11.0 in Rhetoric Skills with a standard deviation of 2.6 (ACT Profile Report, 1996). The average Reading score was 20.7 with a standard deviation of 5.3. The subscores were 10.2 in Social

Studies/Science with a standard deviation of 3.1 and 10.9 in Arts/Literature with a standard deviation of 3.3 (ACT Profile Report, 1996). The Science test showed an average score of 20.7 with a standard deviation of 4.0 (ACT Profile Report, 1996). The Math test average was 19.1 with a standard deviation of 4.5. The subscores were 9.7 in Pre/Elementary Algebra with a standard deviation of 2.9, a 9.4 in Algebra/Coordinate Geometry with a standard deviation of 3.0, and a 9.8 in Plane Geometry/Trigonometry with a standard deviation of 2.6 (ACT Profile Report, 1996). The report showed an average composite score of 20.6 with a standard deviation of 4.1 (ACT Profile Report, 1996).

Economically, Ritchie Counties students come from a wide variety of backgrounds ranging from professional people and store owners to welfare recipients. Ritchie County High School has a 45% free or reduced lunch rate. Graduating students have five choices: work in the family business or farm, get a job at a local company such as Simonton Industries, join the service, or go to college.

DESIGN

The students were given an opportunity to attend an Act lunch preparation seminar for the mathematics section the last week of March.

1997. This was done strictly on a volunteer basis. The students were allowed to leave for lunch 5 minutes early and were allowed to take their lunches to the room where the test preparation seminar was held.

One group of students began every mathematics class with an ACT problem of the day. These problems were very similar to the problems on the mathematics section of the April, June, and December test of 1996. After ten problems had been completed, they were graded as a homework grade and a quiz that consisted of the exact ten problems from the part of the mathematics section of the ACT that had just been completed was administered. Only one teacher at Ritchie County High School did these problems of the day and therefore a comparision was made between those students who had been exposed to these ACT problems and those who had not. A student who had been in the classes where problems of the day were done, had done 150 ACT problems before taking the April test.

College bound students filled out a five year plan in seventh grade. Those students were encouraged to take at least their fourth college prep mathematics course their junior year. The students who followed this advice were taking a combination of trigonometry and probability and statistics during their junior year. A comparision was done of their scores and those

students who were only taking their third college preparatory mathematics course during their junior year.

In May of 1997 a survey was completed by these students to explore what they felt contributed the most to their success or lack of success on the mathematics portion of the ACT test.

PROCEDURES

In November of 1995, the sophomores of Ritchie County High School who registered for and paid their fees, were give the PLAN (Pre-Act) test. This test is designed to recognize strengths and weaknesses of individual students and to predict not only their composite ACT score, but also to predict their individual score on each of the four sections. A copy of these scores was sent to Ritchie County High School and distributed to the teachers who work with ACT preparation of individual sections.

A record was kept of those students who 1) attended the lunch hour ACT mathematics preparation, 2) were exposed to problems of the day from the mathematics section of previous ACT tests, and 3) took their fourth college prepatory mathematics class (Algebra 1, Geometry, Algebra 2, and Trigonometry/Probability and Statistics) during or before their junior year. Results of the April ACT were received in early May, recorded and

distributed to those teachers who work with ACT preparation. The improvement from the predicted scores, taken from the PLAN (Pre-ACT) were then compared to see if students who participated in these programs showed a more significant improvement than those who did not. After the test results were distributed to the students they were then ask to fill out a survey as to what factors they felt contributed to their success or lack of success on the mathematics section of the ACT test.

STATISTICAL ANALYSIS

Results of the PLAN test given in October, 1995, were obtained from the guidance office and the predicted mathematics score was registered for all students who took the April, 1997 ACT Assessment Test. Results of the April, 1997 ACT test mathematics section were obtained from the guidance office and recorded. A two sample T-test was done to see if the average mathematics score of those students who participated in lunch hour prep improved at a .05 or more significant level than the average mathematics score of those who did not.

Old ACT Tests had been obtained by having a student mark the box on his or her application form that requests that his or her test be returned to him or her and paying the additional $10.00 dollar fee. These tests were then

used for problems of the day. A two sample T-test was done to see if the average mathematics score of students who were given problems of the day improved at .05 or more significant level than the average mathematics score of those who were not.

A two sample T-test was done to see if the average mathematics score of those students who took their fourth college prepatory mathematics course improved at a .05 or more significant level than the average mathematics score of those who did not. Two sample T-tests were done to compare the average mathematics scores of students who participated in two of these programs to those who participated in one or none, and students who participated in all three of these programs to students who participated in none, one, or two.

The two sample T-tests were performed after the results of the April 1997 ACT were received in the summer of 1997. These results were categorized into the following categories: the students who took a fourth college prepatory math class during their junior year and those who did not, students whose teacher received copies of old ACT tests and used these tests for Problems of the Day and those students whose teacher did not, students who participated in the mathematics lunch hour prep and those who did not,

those who participated in two of the previously mentioned programs and those who did not, and those who participated in all three of the previously mentioned programs and those who did not. The groups were listed by their PLAN (Pre-ACT) mathematics score and their ACT mathematics score. The difference between these scores was calculated and the two sample T-tests were done to see if there was improvement at the .05 significant level.

CHAPTER 4

RESULTS OF DATA ANALYSIS

RESEARCH QUESTION

The purpose of this study was to investigate the impact of preparation programs designed to improve a student's ACT mathematics score. The programs were incorporated in the school day without interrupting the school's mathematics curriculum.

SETTINGS AND SUBJECTS

The study was conducted using 52 students at Ritchie County High School who took the April, 1997 ACT test and planned a graduation date in May, 1998. The results of the student's mathematics score on the PLAN (Pre-ACT) taken in October, 1995 were compared to the student's mathematics score on the April, 1997 ACT test. The results were compiled in August, 1997 and the student's scores were charted and separated into the following categories: students who were taking their fourth college prepatory math class during their junior year and those who were not, students whose teacher had acquired old ACT tests and used them for problems of the day and those whose teacher had not, students who participated in a week long lunch hour preparation program and those who did not, students who

participated in two of these programs and those who did not, and students who participated in all three of these programs and those who did not.

A two sample t-test was performed on the data to see if any group that participated in these programs improved at the .05 significant level or better, compared to the group that did not participate. A survey was distributed to these same students in May, 1997 to see what programs they felt had the most impact on their mathematics ACT score.

ANALYSIS OF DATA

The first two sample t-test compared the improvement or lack of improvement on the mathematics test of 27 students who were taking their fourth college prepatory math class during the 1996-1997 school year to the 25 who were not.

COMPARISON OF STUDENTS WHO TOOK THEIR 4TH MATH CLASS DURING THEIR JUNIOR YEAR TO THOSE WHO DID NOT

Group	No. of Students	Mean	Standard Deviation
Students who took their 4th college prep math class during their junior year	27	3.70	3.93
Students who did not take their 4th college prep math class during their junior year	25	1.04	2.13

t=3.07 significance level =..0039 degree of freedom=40

The t was equal to 3.07 which was significant at .01. On the basis of this test it was concluded that taking a 4th college prep math class during the junior year had a significant impact on student's scores. The students who had their 4th college math prepatory class during their junior year not only showed an improvement at the .05 significance level, they also showed improvement at the .01 significance level. Therefore taking four college prepatory math classes before you take the ACT test is a very effective way for a student to improve their mathematics score.

The second two sample t-test compared improvement or lack of improvement of the 33 students whose teacher had obtained copies of old

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ACT tests and used them for problems of the day to the 19 students whose teacher had not.

COMPARISON OF STUDENTS WHO DID PROBLEMS OF THE DAY AND STUDENTS WHO DID NOT

Group	No. of Students	Mean	Standard Deviation
Students who did problems of the day	33	3.12	3.80
Students who did not do problems of the day	19	1.21	2.32

t=2.25 significance level=.029 degree of freedom=49

The t was equal to 2.25 which was significant at .05. On the basis of this test it was concluded that students whose teachers acquired copies of old ACT tests and used them for problems of the day did show an improvement of their mathematics score at the .05 significance level. This improvement was not as much as the students who had taken their 4th math class but was still significant.

The third two sample t-test was done to compare the improvement or lack of improvement of the mathematics score of the 28 students who

attended the week long lunch hour prep program to the 24 students who did not.

COMPARISON OF STUDENTS WHO ATTENDED LUNCH HOUR PREP AND THOSE WHO DID NOT

Group	No. of Students	Mean	Standard Deviation
Students who attended lunch hour prep	28	2.71	3.33
Students who did not attend lunch hour prep	24	2.08	3.60

t=.65 significance level=.52 degree of freedom=47

The difference was not statistically significant. On the basis of this test it was concluded that students who attended the week long lunch hour prep did not show statistically significant improvement.

The chart comparing the improvement or lack of improvement of students who were taking their fourth college prepatory math class and whose teacher had acquired old ACT tests and were using them to do problems of the day to those students who did neither, was exactly the same as the students who were taking their fourth prepatory math class, therefore yielding the same result.

The fourth two sample t-test was done to compare the improvement or lack of improvement of the mathematics score of the 16 students who were taking their 4th college prep math class and attended the week long lunch hour prep to the 36 students who did not participate in both of these.

COMPARISON OF STUDENTS WHO TOOK THEIR 4TH COLLEGE PREP MATH CLASS AND ATTENDED LUNCH HOUR PREP AND THOSE WHO DID NOT

Group	No. of Students	Mean	Standard Deviation
Students who were taking their 4th college prep math class and attended lunch hour prep	16	3.25	3.97
Students who did not take their 4th college prep math class or attend lunch hour prep	36	2.06	3.16

t=1.06 significance level=.30 degree of freedom=23

The difference was not statistically significant. On the basis of this test it was concluded that students who were taking their 4th college prep math class and attended lunch hour prep showed no significant improvement over those who did not. This leads to the conclusion that the 4th college prep

math course is more valuable to improving a students ACT score than the week long noon hour prep.

The fifth and last two sample t-test was performed to compare the improvement of lack of improvement of the mathematics score of the 17 students whose teachers acquired old ACT tests and used them for problems of the day and also attended lunch hour prep to the 35 students who did not.

COMPARISON OF STUDENTS WHO DID PROBLEMS OF THE DAY AND ATTENDED LUNCH HOUR PREP AND THOSE WHO DID NOT

Group	No. of Students	Mean	Standard Deviation
Students who had problems of the day and attended lunch hour prep	17	3.06	3.93
Students who did not have problems of the day and attend lunch hour prep	35	2.11	3.19

t=.86 significanc level=.40 degree of freedom=26

The difference was not statistically significant. On the basis of this test it was concluded that the students were given problems of the day and attended lunch hour prep did not show a significant improvement over those who did not.

Compiling the data for the two sample t-test to see if the improvement of students who participated in all three programs was significantly better than those who did not participate in all three, it was realized that the data was exactly the same as the data comparing the students who took a fourth college prep math class and attended lunch hour prep and those students who did not. This would therefore yield the same result that there was no significant improvement.

The data showed that the two things students can do to improve their ACT mathematics score is to take a 4th college prepatory math class their junior year and do problems of the day.

ANALYSIS OF SURVEYS

Fifty-two surveys were completed in May, 1997 by the juniors who had taken the April, 1997 ACT test. The test results were not back yet, so these students had no idea how well they had done.

The first question simply asked them to circle the math classes of which they had completed at least one semester before taking the ACT Test. Twenty-seven students circled at least four classes including Trigonometry. Three of these students also circled a fifth classs: College Algebra.

Seventeen students circled Algebra 1 and 2 and Geometry. Eight students circled Algebra 1 and Geometry. Two students circled only Algebra 1.

The second question asked the students to list the classes that they felt had the most positive effect on their ACT mathematics score. Twenty-six of the twenty-seven students who had trigonometry listed it as one of the classes. Algebra 2 was also listed by sixteen of the twenty-seven and Geometry by eight of the twenty-seven. The three students who had taken Trigonometry and College Algebra together felt that this was an excellent combination. Most of the students, who had not taken Trig, listed Geometry as the class that had the most positive effect on their ACT mathematics score. A few students stated that all math classes had a positive effect.

The third question asked if the students felt that trigonometry was a necessary class in order to achieve a maximum ACT math score. Twenty-six of the twenty-seven students who had trigonometry answered yes and twenty-one of the twenty-five who had not had trigonometry answered yes.

The students were then ask to list any additional comments concerning classes needed for a maximum ACT mathematics score. A few of these are listed below:

More multiple choice tests are needed because the ACT is multiple choice.

I think College Algebra is very important.

If you pay attention and do your own work the math classes offered here are sufficient to prepare you for the test.

Taking higher science classes helps because you have to use the math.

The more math you have the higher you will score.

Practice ACT tests should be taken with a time limit because sometimes the test does not measure what you know, but how fast you can do the problems.

There should be a time limit on more test because the ACT is timed.

A student should study for the ACT outside of school by using computer programs if they really want a maximum score.

The next question asked students if their math teacher did problems of the day. Thirty-three answered yes and nineteen no. They were then asked if they circled yes did they feel that the problems of the day helped their ACT mathematics score, and if they circled no did they feel that not doing problems of the day hurt their mathematics score. Thirty-two of the thirty-three who circled yes felt that the problems of the day did help their score and fifteen of the nineteen who circled no felt that not doing problems of the day hurt their mathematics score.

The students were then asked to list any additional comments concerning problems of the day and their effect on the students mathematics score. Most of the comments were positive such as the ones listed below:

They helped because they were exactly what was on most of the ACT test.

They gave me an understanding of the math we had not covered yet.

I think all math classes should do problems of the day.

I didn,t do as well as I should have during class but I always did the problems of the day and that helped me a lot.

Problems of the day teach students the types of questions to expect and how they are solved.

I think problems of the day show that the teacher cares about our future and not just their class.

I wasn't scared of the test after I had done problems of the day all year.

The problems allowed you to focus on one concept at a time.

They helped me remember things I had forgotten from previous classes.

They made me ready for any trick questions that might show up on the ACT.

They helped relieve the stress involved in preparing for the ACT test.

I didn't have problems of the day and therefore didn't recognize several problems on the ACT test.

All comments were not positive as some students felt the problems were worked too fast and not explained very well. Other students commented that they couldn't keep up so after a while they simply gave up and copied down the answers.

The next question asked students if they attended lunch hour prep. Twenty-eight said yes and twenty-two said no. The ones who answered yes were then asked if they felt that the lunch hour prep helped their ACT score. Sixteen of the twenty-eight replied yes but of those sixteen, eleven added somewhat. The ones who circled no were then asked if they thought it hurt their ACT score. Twelve of the twenty-two said yes, and four of those twelve added probably. The students who circled no were then asked why they did not attend. The most popular answer was that the students enjoyed their lunch too much and did not want to give it up. Other students had commitments such as prom committee meetings and vocational school. While some students felt they did not need to because they had been given problems of the day or had attended ACT prep at Upward Bound. A few very honest students stated that they were simply too lazy and felt it would be a waste of time.

The last question asked students to list any additional comments they may have concerning lunch hour prep and its effect on their ACT. Many of the students stated that although, they were very appreciative of the teachers who gave up their lunch to help them, the problem was that there were simply too many students and not enough time. Some students felt that the

Algebra review helped but problems such as test time limits could not be addressed. Students even suggested that lunch was not a good time and that a separate class should be taught solely for the purpose of preparing for the ACT.

The surveys showed that the students were aware of what was beneficial to their mathematics score and what was not. Their comments agreed with the statistical analysis, taking a fourth college prep math class and doing problems of the day were the most beneficial programs.

CHAPTER 5

RESULTS, CONCLUSIONS, RECOMMENDATIONS

PURPOSE OF THE RESEARCH

The ACT test has become an important measure used by colleges and universities to decide which students will be admitted into programs, awarded scholarships, and who will have more academic success as college freshman. The students who do well on the ACT; receive more financial aid, have a better chance of pursuing their chosen career, and are more likely to be accepted into the college of their choice.

The mathematics section of the ACT is often a student's lowest score. If a students can improve their mathematics score usually their composite score will increase. The question then is: can a student, in the confines of a normal school day, improve his or her mathematics score by participating in test preparation programs.

RESEARCH TESTING

Three types of improvement preparation programs were tested:

1. Taking a 4th college prep math class a students junior year
2. Doing problems of the day taken from old ACT math tests
3. Participating in a week long lunch hour preparation program

The subjects were fifty-two juniors at Ritchie County High School in the school year 1996-97. These student's predicted ACT mathematics score, taken from the October, 1995 PLAN (Pre-ACT) test, were compared to their actual ACT mathematics score on the April 1997 test. The improvement or lack of improvement of these students was then charted.

Two-sample t-tests were conducted on each of the three programs and also on all combinations of two or three of the programs. The tests were done to see if any of the programs resulted in significant improvement. A survey was then conducted of these same fifty-two students to see what they felt had the most impact on their ACT mathematics score.

RESULTS OF THE TESTS

The tests showed the following:

1. A significant difference was shown in the student's scores who were taking their fourth math class during their junior year. This test not only was at the .05 significance level, but also at the .01 significance level.
2. A significant difference was shown in the student's scores who did problems of the day.
3. A significant difference was not shown in the student's scores who attended the week long lunch hour prep program.

4. A significant difference was shown in the student's scores who took their 4th college prep math class their junior year and did problems of the day. These were exactly the same students who were taking their 4th math class.

5. A significant difference was not found in the student's scores who were taking their 4th math class and attended lunch hour prep.

6. A significant diffenence was not found in the student's scores who did problems of the day and attended lunch hour prep.

7. A significant difference was not shown in the student's scores who participated in all three programs.

CONCLUSIONS

The best way for a student to improve his or her mathematics score is to take as many math classes as possible before taking the ACT test. The score of these students on the PLAN (Pre-ACT) was also higher and yet they still showed significant improvement over the students who were not taking a 4th math class during their junior year. Another way to improve a student's mathematics score is to purchase old ACT tests and use them to do problems of the day. Students who have problems of the day during their junior year will have seen at least 150 ACT type problems before taking the test. A few of these students had been doing problems of the day for two or three years

and had seen as few as 330 and as many as 510 ACT mathematics problem. The answer to the research question is: Students can improve their mathematics score by participating in test preparation programs.

The week long lunch hour preparation program did not prove to be a way for these students to improve their mathematics score. The problem was that there were simply too many students who participated and too little time. The surveys showed exactly what the research showed. Practically every student who took trigonometry or College Algebra as his or her fourth math class said that the class improved their ACT mathematics score. A large majority of the students who did problems of the day felt that the problems helped their ACT mathematics score tremendously. Although some students felt the lunch hour prep program provided a needed review, the majority felt that too many students participated and there was too little time.

IMPLICATIONS OF THE RESEARCH

After discussing this research with the principal, it was decided to offer a year long class in ACT mathematics preparation. The first six weeks would be Geometry review, the second six weeks Algebra Review, the third six weeks Trig and other reviews, and the second semester would be spent thoroughly covering the ACT test from April, June, and December, 1997.

A one hour lunch was initiated and teachers were assigned to conduct a year long ACT preparation in English, Math, and Science during one-half of their lunch. Seniors who are trying to improve their scores will attend this program the 1st semester and juniors who are not taking the ACT prep will attend the second semester.

FURTHER RESEARCH

Future research might compare girls and boys test scores. Also a future study might also examine girls' participation in upper level math classes. A two sample t-tests will be done on the 30 juniors in ACT mathematics preparation class, to see if a longer preparation program does in fact produce better results.

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APPENDIX

Survey for Research Project

1. Circle the classes that you completed at least one semester of, before taking the ACT test.

Algebra 1 Algebra 2 Geometry Trigonometry

College Algebra List others:

2.Which class or classes do you feel had the most positive effect on your ACT score?

3. Do you feel Trigonometry is a necessary class in order for you to achieve your maximum ACT math score:

List any additional comments you may have concerning classes needed for a maximum ACT score:

4.Did your math teacher during your junior year do ACT problems of the day in class? YES NO

5. If yes, do you feel this improved your ACT math score?

6. If no, do you feel this hurt your ACT math score?

List any additional comments concerning problems of the day and their effect on your ACT score:

7. Did you attend lunch time ACT math prep the year you took the test?

YES NO

8. If yes, do you feel that it improved your ACT math score?

9. If no, why did you not attend?

10. If no, do you feel that not attending hurt your ACT math score?

List any additional comments concerning lunch time ACT math prep and its effect on your ACT math score:

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